

NON-PUBLIC?: N
ACCESSION #: 9007200197

LICENSEE EVENT REPORT (LER)

FACILITY NAME: D. C. Cook Nuclear Plant - Unit 2 PAGE: 1 OF 5

DOCKET NUMBER: 05000316

TITLE: Reactor Protection System Actuation Caused By A Power Range,
Neutron Flux, High Negative Rate Signal

EVENT DATE: 06/11/90 LER #: 90-004-00 REPORT DATE: 07/11/90

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 086

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: P. F. Carteaux - Safety and TELEPHONE: (616) 465-5901
Assessment Superintendent

COMPONENT FAILURE DESCRIPTION:

CAUSE: X SYSTEM: SN COMPONENT: LS MANUFACTURER: M040

X JB LT F180

X AA IL W120

X AA HS W120

REPORTABLE NPRDS: N

Y

N

Y

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On June 11, 1990 at 1417 hours, the Unit 2 reactor tripped from a power range, neutron flux, high negative rate signal. This signal requires a 2 out of 4 (2/4) logic to initiate a trip. Although the cause of the trip is not conclusively known, it is believed that a drop of more than one (1) control rod caused the reactor to trip. At the time of the reactor trip, a technician was walking on top of the rod control system power cabinets. It could not be determined whether the presence of the

technician contributed to the postulated rod control system failure. No hardware failure that would have resulted in the dropping of control rods was identified. Prior to Unit restart, all control rods were successfully exercised.

Following the reactor trip, no malfunctions of safety-related systems or components occurred. In addition, all safety equipment responded as designed. The NRC was notified via the Emergency Notification System (ENS) at approximately 1537 hours on June 11, 1990.

END OF ABSTRACT

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Conditions Prior to Occurrence

Unit 2 reactor (EIIS/AB-RCT) in Mode 1 (Power Operation) at 86 percent rated thermal power.

Description of Event

On June 11, 1990 at 1417 hours, a reactor protection system (EIIS/JE) actuation (reactor trip) occurred due to a power range (EIIS/IG-CH), neutron flux, high negative rate signal. This signal requires a time-compensated 2/4 logic to initiate a reactor trip.

During the day of the reactor trip, at 0930 hours, Maintenance personnel had initiated surveillance testing of ionization and infrared detectors (EIIS/IC-DET). At the time of the reactor trip, a technician was on top of control rod (EIIS/AA-ROD) power cabinets (EIIS/AA-CAB) while working on overhead fire detectors. Although the technician was aware of his proximity to sensitive equipment, and no bumping of any components was reported, his possible contribution to a spurious rod control system failure cannot be discounted.

Following the reactor trip sequence opening of the reactor trip breakers (EIIS/JE-BKR), turbine (EIIS/TA-TRB) trip, insertion of reactor control rods, feedwater isolation (EIIS/JB), and automatic starting of the motor-driven auxiliary feedwater pumps (EIIS/BA-P)!, Operations Department personnel immediately performed Emergency Operating Procedures (EOPs) to verify proper response of the automatic protection system and to assess plant conditions for indicated appropriate recovery actions. Minor failures of components were reported following the trip. These included: North heater drain pump (EIIS/SN-P) failed to trip, rod bottom light (EIIS/AA-IL) for control rod C-7 failed, and steam generator (EIIS/SB-SG) No. 21 - Channel 3 low level bistable (EIIS/JB-LT) failed.

Cause of the Event

Although the cause of the trip is not conclusively known, it is believed that a drop of two (2) or more control rods caused the reactor to trip on a high negative rate signal. Other possible causes considered included the simultaneous failure of two (2) power range channels, and a reactor protection system logic failure. The coincidental failure of two power range channels is considered highly unlikely. Subsequent testing showed no nuclear

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instrumentation abnormalities. Similarly, post trip testing of the reactor protection system (RPS) logic failed to identify a cause for the reactor trip. Historically, RPS logic failures have resulted in a significant delay when opposite RPS train response times are compared. In this case, both trains of reactor protection processed the negative rate signal simultaneously. This RPS response is indicative of an actual negative rate condition.

Following the trip, phase B of the stationary gripper power supply (EIIS/AA-JX) to control rod power cabinet 2AC was found with a high resistance across its disconnect switch (EIIS/AA-HS). However, the failure of one phase of the stationary gripper power supply alone is not sufficient to cause a control rod to drop. At least two phase failures are needed. Recommendations for rod control system preventive maintenance had not previously identified a need for power supply disconnect and associated buswork inspections. The lack of preventive maintenance may have increased the component's sensitivity to external forces. This, coupled with the presence of the technician on top of the power cabinets, may have resulted in a momentary failure and subsequent multiple rod drop event.

Analysis of Event

This event is being reported in accordance with 10 CFR 50.73 (a) (2) (iv) as an event that resulted in an unplanned automatic actuation of the engineered safety features, including the reactor protection system.

The automatic protection responses, including reactor trip and its associated actuations, were verified to have functioned properly as a result of the reactor trip signal. Based on the above, it is concluded that the event did not constitute an unreviewed safety question as defined in 10 CFR 50.59 (a) (2), nor did it adversely impact the health and safety of the public.

Corrective Action

All rod control power cabinet disconnect switches and fuses (EIIS/AA-FU) were inspected. Phase B of the power supply to control rod power cabinet 2AC was found with a high resistance across its disconnect switch. The questionable disconnect box was removed from its bus duct (EIIS/AA-BDUC) inspected,

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disconnect switches exercised, and proper operation verified. Fuses were also replaced as a precaution. All other power cabinet disconnect boxes were also inspected; however, no abnormalities were discovered.

The buswork that transfers power from the reactor trip breakers to the power cabinet disconnect switches was inspected for proper tightness at each of the junctions. Each joint was found clean and tight.

Each control rod power cabinet was inspected for blown fuses, loose fuse clips, and wire tightness. No problems were found in any of the cabinets.

Control Rod Drive Mechanism (CRDM) (EIIS/AA-DRIV) resistance checks were performed on rods in the 2AC power cabinet. The resistances were found within acceptable limits.

After extensive checks of the rod control system (EIIS/AA) failed to uncover evidence of failure, all control rods were exercised in and out using a special procedure. All control rods performed normally during the performance of the special procedure.

Although the presence of the technician on top of the power cabinets could not be confirmed as a contributor to the reactor trip, the policy to utilize tools, equipment, and components only for their intended function was reinforced to affected personnel.

The preventive maintenance program for the rod control system will be enhanced to include periodic inspection of power supply buswork, disconnects and fuse clips.

Repairs to the North heater drain pump, rod bottom light for control rod C-7, and steam generator No. 21 - Channel 3 low level bistable were completed prior to Unit restart on June 14, 1990.

Failed Component Identification

Plant I. D. No: 2-HLS-403 (Condensate heater shell side extreme low level switch)

Manufacturer: Magnetrol International Inc.

Model No: 249-C-MP

EIIS Code: EIIS/SN-LS

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Plant I. D. No: 2-BLP-112 (Steam generator reactor protection input narrow range level transmitter)

Manufacturer: Foxboro Co.

Model No: N-E13DM-HIM2-BL

EIIS Code: EIS/JB-LT

Plant Description: Control Rod C-7 Bottom Light Bistable

Manufacturer: Westinghouse

Model No: HD2E-E2784

EIIS Code: EIIS/AA-IL

Plant Description: Power Supply to Control Rod Power Cabinet 2AC Disconnect Switch

Manufacturer: Westinghouse

Model No: 44E3058

EIIS Code: EIIS/AA-HS

Previous Similar Events

None.

ATTACHMENT 1 TO 9007200197 PAGE 1 OF 1

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Cook Nuclear Plant

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MICHIGAN

POWER

July 11, 1990

United States Nuclear Regulatory Commission

Document Control Desk

Rockville, Maryland 20852

Operating Licenses DPR-75
Docket No. 50-316

Document Control Manager:

In accordance with the criteria established by 10 CFR 50.73 entitled
Licensee Event Reporting System, the following report is being submitted:

90-004-00

Sincerely,

A. A. Blind
Plant Manager

AAB:clj

Attachment

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